SUPPLEMENT.

The Mining Journal,

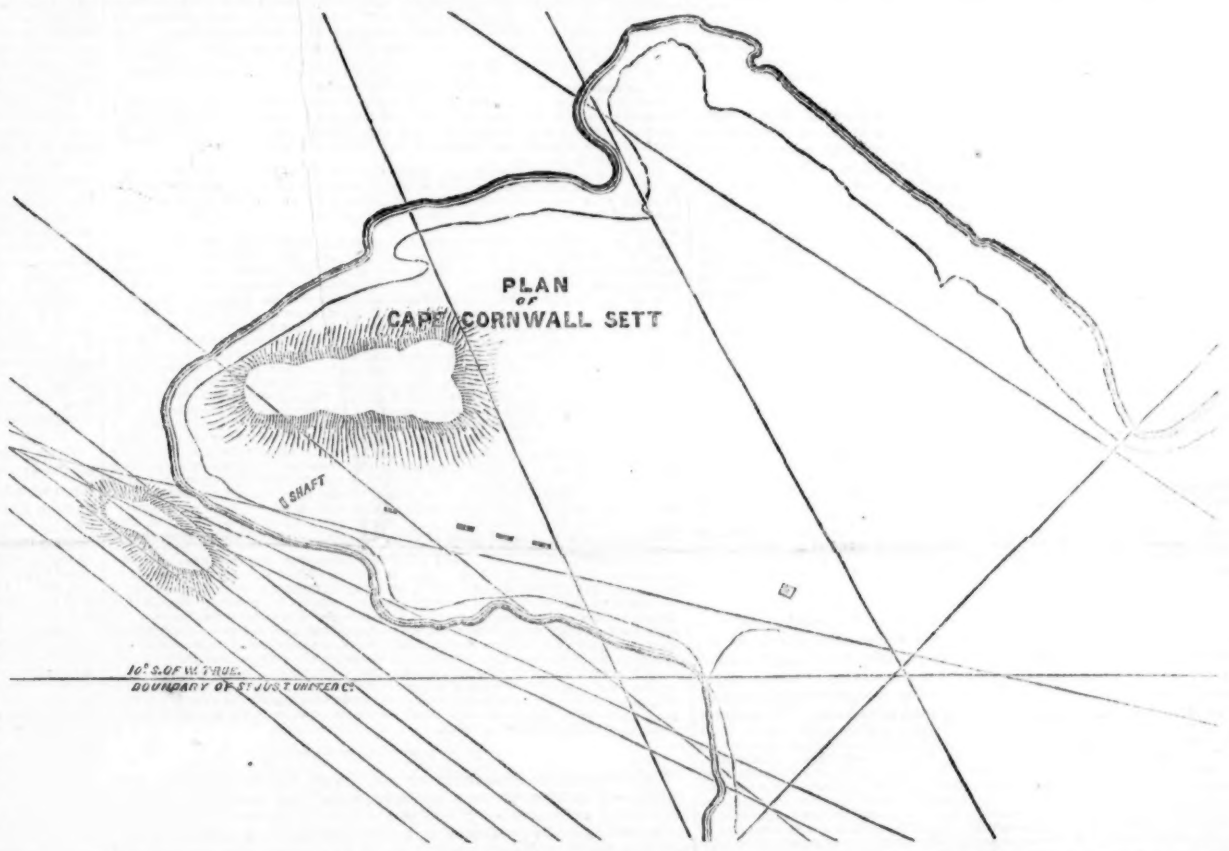
RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

No. 1489.—Vol. XXXIV.] LONDON, SATURDAY, MARCH 5, 1864. [WITH JOURNAL] STAMPED.... SIXPENCE. UNSTAMPED. FIVEPENCE.

PLAN OF THE CAPE CORNWALL ST. JUST CONSOLIDATED TIN AND COPPER MINE,

SHOWING THE LODES AND BOUNDARY OF THE SETT.



A most inviting and promising investment is this week brought prominently before the public, and cannot fail to attract attention, more especially, perhaps, that of our own readers, and those who are interested in mining operations. The concern to which we allude is the CAPE CORNWALL ST. JUST CONSOLIDATED TIN AND COPPER MINING COMPANY (Limited), which has been established under very favourable and respectable auspices, several well-known names being associated with it, and which stamp the concern as a sound and *bona fide* undertaking. The prospectus, which appears in another column of this day's Journal for the first time, will well repay careful perusal, and clearly shows the objects and the anticipations of the company.

It is not necessary to enlarge upon the many prominent features in connection with this adventure, nor is it within our province, as journalists, to advise the investing public as to the best undertakings in which to embark their capital; but we should be wanting in attention to the interest of legitimate mining, and also that of our readers, if we were to pass unnoticed those undertakings which appear upon facts, and not theories, to merit particular observation, and command special consideration and remark.

Cape Cornwall (which is well known to tourists to the Land's End) is a bold promontory jutting into the Atlantic, and situated, like the Great Botallack Mine, at the western extremity of the great copper and tin lodes which run eastward through Cornwall as far as Dartmoor Hills. This portion of Cornwall comes within the great metalliferous district of the county, being from the most remote period of its history celebrated for great mineral wealth, and the mineral veins running through the granite formation, which prevails towards the Land's End, are found penetrating the rugged cliffs, so that nothing but the sea appears to cut them off; they may be easily traced by the practical geologist and miner, and are found to be even better defined and richer at the very sea verge. The Cape Mine occupies a geological position identical with its justly-celebrated and romantically-situated neighbour, the Botallack Mine, which has given such handsome profits to its enterprising and fortunate shareholders; placed upon the junction of the granite and killas, or clay-slate formation, which has ever been looked upon as a most important geological feature in the eyes of all practical mining authorities, and more especially in the St. Just district, where the lodes undergo so remarkable a change (producing tin in the granite and copper in the killas), it appears to offer every possible inducement to the spirited capitalist (existing, as it does, under such peculiar parallels) to thoroughly and vigorously develope.

A reference to the Mining Map of the St. Just Parish, published by Mr. Symons, will show most distinctly that the lodes run toward the Cape Mine—indeed, this is borne out by the evidence established in working the St. Just United Mines, adjoining the Cape property, where the mineral veins are proved to be converging towards the head of the Cape, forming a junction near the engine-shaft, which is already sunk some 500 ft. This will be the principal point of operations; and as in the Botallack Mine, 24,000*l.* was paid in dividends in one year from only one lode (the copper being the richest in the county), what may this company not expect when they have several lodes to work upon of proved value?—to ascertain this is the intention of the Cape Cornwall Company.

The capital of the company is considered more than sufficient to bring the mine into a highly successful state. There are 8000 shares, of 2*l.* 10*s.* each; and, as a guarantee of the high opinion entertained of the concern, 6000 shares have been already subscribed, and which we consider a criterion of no small importance. It will be observed that applications for the remainder must be sent in speedily, as the share list positively closes on Friday next, the 11th inst. To conclude, looking at all the points in connection with the establishment of this company, we cannot help thinking that it deserves the cordial co-operation and support of all interested in mining pursuits, and we wish it every success, and hope that the anticipations of those who have associated themselves with it will be realised.

GEOLOGICAL SOCIETY OF LONDON.

At the annual general meeting, on Feb. 19, Prof. A. C. RAMSAY, F.R.S. (the President), announced the award of the Wollaston Gold Medal to Sir RODERICK IMPEY MURCHISON, K.C.B., &c., for his many distinguished services to Palæozoic Geology, especially (1) for his great work entitled the "Silurian System;" (2) for his important work on the Geology of Russia; and (3) for his remarkable discovery of the true relations of all the rocks beneath the Old Red Sandstone that form the Highlands of Scotland; and, in handing the medal to the eminent recipient, he took occasion to review briefly the influence of these various labours on the progress of Geological Science. Sir Roderick Murchison, on receiving the medal, expressed his deep sense of the honour which had been done him by the society, and which was enhanced by its being communicated to him through his friend and colleague, Prof. Ramsay.

The President then stated that the balance of the proceeds of the Wollaston donation fund had been awarded to M. Deshayes, to assist him in his work on the Mollusca of the Paris Basin, and in testimony to the high esteem in which the Geological Society held those labours, and placed it, together with a diploma to that effect, in the hands of the foreign secretary, for transmission to M. Deshayes.—Dr. Falconer briefly thanked the society on behalf of his distinguished friend, and stated that he should have much pleasure in conveying to him this mark of the society's approbation.

The President proceeded to read his anniversary address, prefacing it with biographical notices of lately deceased Fellows of the society—namely, Lucas Barrett, the Marquis of Lansdowne, John Taylor, Prof. E. Mitscherlich, and S. P. Pratt; he also gave a sketch of the chief labours of the late Rev. Stephen Hislop. In the address the President discussed the Breaks in succession of the British Mesozoic Strata, thus endeavouring to discover how far and in what manner the same kind of reasoning as that employed in the last address is applicable to Secondary formations. First, however, he examined the numerous relations which different classes of animals bore to one another in Palæozoic times, comparing them with their development in secondary epochs. The general conclusion arrived at was that a long interval of time, often stratigraphically unrepresented, is an invariable accompaniment of a break in the succession of species; and the more special inference was that, in cases of superposition, in proportion as the species are more or less continuous, that is to say, as the break in life is partial or complete, first in the species, but more importantly in the loss of old and the appearance of new genera, so was the interval of time shorter or longer that elapsed between the close of the lower and the commencement of the upper formation.

The Secretary read the reports of the council, of the museum and library committee, and of the auditors. The unexampled increase in the numbers of the society, and the state of the society's finances, were considered to be extremely satisfactory.

The ballot for the council and officers was taken, and the following were duly elected for the ensuing year:—

PRESIDENT—W. J. Hamilton, F.R.S. VICE-PRESIDENTS—R. A. C. Godwin-Austen, F.R.S.; Edward Meryon, M.D.; J. Carrick Moore, F.R.S.; Sir R. I. Murchison, K.C.B., F.R.S.

SECRETARIES—P. Martin Duncan, M.B.; Warington Wm. Smyth, M.A., F.R.S. FOREIGN SECRETARY—Hugh Falconer, M.D., F.R.S.

TREASURER—Joseph Prestwich, F.R.S.

COUNCIL—John J. Bigsby, M.D.; Robert Chambers, F.R.S.E. and L.S.; P. Martin Duncan, M.B.; Robert Etheridge; John Evans, F.S.A.; Rev. Robert Everest; Hugh Falconer, M.D., F.R.S.; R. A. C. Godwin-Austen, F.R.S.; William John Hamilton, F.R.S.; J. Gwyn Jeffreys; M. Auguste Laugel; Sir Charles Lyell, F.R.S. and L.S.; Robert Mallett, C.E., F.R.S.; Edward Meryon, M.D.; John Carrick Moore, F.R.S.; Prof. J. Morris; Sir R. I. Murchison, K.C.B., F.R.S.; Joseph Prestwich, F.R.S.; Prof. A. C. Ramsay, F.R.S.; Warington W. Smyth, M.A., F.R.S.; Alfred Tylor, F.L.S.; Rev. Thomas Wiltshire, M.A.; S. P. Woodward.

FEB. 24.—Edward Easton, Upper Bedford-place, Russell-square; Geo. Maw, F.L.S., F.S.A., Benthall Hall, near Broseley; Joseph Elliott Square, Stanley-crescent, Kensington Park, London; Edwd. B. Tawney, Assoc. Royal School of Mines, were elected Fellows.

The following communications were read:—

1. "On further Discoveries of Flint Implements and Fossil Mammalia," by J. Wyatt, F.G.S.—2. "On some Recent Discoveries of Flint Implements in Drift Deposits in Hants and Wilts," by John Evans, F.G.S., P.S.A.

On Wednesday, the following papers will be read:—1. "On the Discovery of the Scales of Pteraspis, with some remarks on the Cephalic Shield of that Fish," by E. Ray Lankester; communicated by Prof. T. Huxley, F.R.S., F.G.S.—2. "On some Remains of Bothriolepis from the Upper Devonian Sandstones of Elgin," by G. E. Roberts; communicated by Prof. J. Morris, F.G.S.—3. "On Missing Sedimentary Formations from Suspension or Removal of Deposits," by J. J. Bigsby, M.D., F.G.S.

THE LONDON ASSOCIATION OF FOREMEN ENGINEERS.

The eleventh anniversary of the formation of this society was celebrated on Saturday, Feb. 27, by a dinner at Radley's Hotel, New Bridge-street, Blackfriars. About 130 members and friends of the institution joined in the proceedings, which were in all respects of an interesting character. Among the principal gentlemen present on the occasion were—Messrs. Henry Grissell and James Robertson, who officiated as Chairman and Vice-Chairman; Mr. E. J. Reed, Chief Constructor of the Navy; the Hon. Mr. Duncan; Mr. Telford Field, of the firm of Maudslay, Sons, and Field; Captain Blakely; Mr. Hodges; Captain Macgregor; Mr. Passmore Edwards; Mr. Simpson, of Pimlico; Mr. Cohen; and Mr. Joseph Newton, of the Royal Mint, President of the Association.

The secretary's report, read immediately before the toast of the evening was proposed by the Chairman, conveyed the gratifying information that the affairs of the society were in a flourishing condition, and that it numbered at present 75 ordinary and 28 honorary members. The amount invested in the name of its three trustees—Messrs. Newton, Hoskins, and Briggs—was 347*l.* 17*s.* 9*d.*, whilst, in addition to this, the treasurer, Mr. Meredith Jones, held 20*l.* in hand for meeting current contingencies. The papers which had been read during the past year, as gathered from the official report, were as follows:—

"On a New Marine Propeller"	by Mr. Newton.
"Heavy Forgings in Iron"	Mr. Muir.
"The Manufacture of Locks"	Mr. Hume.
"Boiler Explosions"	Mr. Gettelliffe.
"Coating Telegraph Wires"	Mr. Miller.
"Hollow Iron Castings"	Mr. Oubridge.
"Substitute for the Link Motion"	Mr. Stanley.

The SECRETARY further stated that in consequence of several deaths during the year, and the fact that trade had been very much depressed, considerable sums had been paid to surviving relatives of members, and to members out of situations, but that, in spite of all, the funds in hand had increased. The library had also been added to, but its further augmentation was very desirable.

On the conclusion of the secretary's statement, the CHAIRMAN rose and proposed the toast—"Prosperity to the Association of Foremen Engineers." He confessed that when, a dozen years before, this society had been founded he looked upon its establishment with some misgivings. The labour market, so far as mechanical trades were concerned, was then in a disturbed state, owing to certain strikes among the working men engaged in them, and the very name of trade unions of any kind was distasteful to him. It was only fair now to state that those misgivings had been banished from his mind. The Associated Foremen had most scrupulously guarded themselves against the discussion of shop politics, and their meetings were entirely of an instructional and philanthropic kind. He thought, however, that it would be a desirable thing, if he might venture to offer the suggestion, for the benevolent fund of the society to be made separate and distinct from that employed for literary and scientific purposes. Mr. Grissell further spoke, and at considerable length, upon workshop courtesies as practised abroad and at home, counselling in some respects an imitation of foreign customs of salutation, &c. In conclusion, and as a proof of his sincerity in wishing prosperity to the association, the worthy gentleman promised to become an honorary member of it, and to place 50*l.* in the hands of its treasurer towards forming a superannuation fund, provided nine other engineering employers, or others, would do likewise. He also begged to couple with the toast he had given, the name of Mr. Joseph Newton, President of the society.

It is unnecessary to say that the remarks of Mr. Grissell, as well as the toast he gave, were enthusiastically received.

Mr. NEWTON, who on rising was much applauded, then proceeded, on behalf of the association, to thank the meeting for the favour which had just been conferred upon it. He had been connected with the society for seven or eight years, and for five years had filled the post of President. From very few of its monthly meetings during that period had he been absent, and he was enabled to speak positively as to the nature of its acts and its deliberations. In no single instance during that period had one word been uttered by a member of the association which could in any way be considered inimical to the interests of employers. On the contrary, the best possible feeling existed towards them; and on many occasions he had witnessed the occurrence of things at their meetings which tended directly to their (the employers') material advantage. Foremen were in the habit at such times of consulting together upon difficult pieces of work in hand in their factories, and the result of their consultations frequently had been that, benefiting by the past experience of others, they were enabled to go back to their respective duties, and to execute them off hand, and without going through the costly process for their employers of a series of experiments. As regarded the benevolent fund of the society, it also was valuable to employers; for, when members became aged—if that fund were large enough to allow of it—the latter would be entitled to weekly allowances for the remainder of life, instead of taxing the generosity of their masters. From whatever point of view, indeed, he regarded the society—and as a Government officer he stood, as it were, on neutral ground, and could look dispassionately on the interests of employers and employed—he saw reasons for approving it. He begged to thank the Chairman for the generous way in which he had dealt with the association, and must say that, on seeing so distinguished a man presiding over them, and so many others supporting him, he (Mr. Newton) was deeply gratified. He begged, in conclusion, to propose—"The Health of the Employers, and Success to the Engineering Trade."

Mr. TELFORD FIELD returned thanks, and in a brief but appropriate speech announced his intention of adding his name to the list of honorary members of the association, and contributing a second 50*l.* to its benevolent fund.

Several other toasts followed, but the most conspicuous, and that which induced the greatest amount of interest, was "The Scientific and General Press," given in eloquent terms by the Vice-Chairman, and eloquently responded to by Mr. Passmore Edwards; Mr. Cooper; and Mr. W. Smith, who announced his intention of making the 50*l.* fund,

to which Mr. Grissell and Mr. Field had so nobly subscribed, guineas, or, in other words, of contributing 25*l.* to the promotion of the charitable objects of the society.

At 12 o'clock the company dispersed, after singing the National Anthem.

NOVEL MODE OF PRODUCING OXYGEN GAS.—At a lecture delivered at the Hammam, Jermyn-street, on Monday, by Dr. Leared, Physician to the Hospital for Consumption, a novel mode of producing oxygen gas in a perfectly safe, cheap, and simple manner, was introduced for the first time in public by Mr. Robins, the analytical chemist. The method consists in treating chromate of potash and peroxide of barium with diluted sulphuric acid. The operation is performed in a common glass jar or retort, and at the ordinary temperature. To those who are acquainted with the plan hitherto adopted of heating manganese in iron bottles this discovery will need little recommendation, and it is difficult to predict to what discoveries and improvements in the economy of life and light it may lead.

PRECIPITATION OF COPPER.—An improvement in the precipitation from the solutions of sulphates of copper, cobalt, and nickel to obtain their chlorides has been proposed by Mr. Alfred Monnier, of Philadelphia. Instead of precipitating with lime, or other re-agent, and then dissolving in hydrochloric acid, Mr. Monnier proposes to treat the sulphates direct by the use of chlorides, of sodium or other compounds of chlorine, such as chloride of potassium, of calcium, of magnesium, of strontium, and the hypochlorites of lime, potassa, or soda; but especially the chloride of sodium, because of its cheapness, and the readiness with which it may be obtained.

LINING IRON TUBES.—An invention has been patented by Mr. John Chatterton, of Highbury, which consists in lining tubes and hollow vessels, whether of iron or other metal or material, capable of resisting great pressure, with lead or other soft metal, or alloy, or gutta percha, or other material or composition capable of being rendered plastic by the application of heat, and in forcing the lining into intimate contact with the interior surface of the tube or vessel to be lined by means of internal pressure. He adopts different methods of operation, according to the nature of the tube to be lined, and the substance with which it is intended to line it. For instance, in lining iron tubes with lead he takes an ordinary length of iron tube, by preference a 12-ft. length of wrought-iron tube, and inserts therein a similar length of thin lead tube, taking care that the diameters and shape are such that the one will pass freely into the other. He brings the ends parallel, and drives or draws a short smooth conical mandril from one end of the tubes to the other, which mandril in its progress expands the inner tube till the outer surface thereof is in contract with the inner surface of the iron tube. This driving or drawing of the mandril may be effected by any of the well-known mechanical appliances suitable to the draw-bench, but he prefers thus to use hydraulic pressure. At the base of the conical mandril he fits a cupped leather, or a separate piston with a cupped leather attached; he inserts the said mandril and piston in one end of the inner tube, and upon the outer tube he screws a cap, having a pipe attached to it in connection with a force-pump. Such pressure of water is then applied against the piston as may be found necessary to drive the mandril from one end of the tube to the other. Sometimes he screws a stop to the further end of the tubes, to prevent the egress of the mandril. The pressure on the pumps can then be increased, and the tube further expanded (if necessary) by pressure of water alone. When the material to be lined may be rendered plastic by immersion in hot water, he inserts one tube within the other, in the manner described for lining iron tubes with lead, and then by means of caps he makes both ends water-tight. Into one of the caps he fixes a pipe in connection with a force-pump, and injects hot water at such a pressure as may be found requisite to expand the inner tube to the extent required. He then either suffers the water to cool or lets it escape through a stop-cock, and supplies its place with cold water by means of the same or another pump, so that the inner tube, by being reduced in temperature, may return to its normal condition of rigidity, but permanently retain its increased diameter. He makes a few small holes in the outer tube to permit the air between the two tubes to escape, as egress for it at the ends is cut off by the caps; these holes are easily plugged when the operation of lining is completed.

SOLID METAL TUBING.—An improved mode of drawing metals, especially steel and iron, by hydraulic power without heat was described in the *Mining Journal* some time since, and the machine, which has now been perfected, has been satisfactorily tested at Mr. Almond's works, Bermondsey. At present the iron tubes for boilers, condensers, gas, and gun barrels, are produced by welding the two sides of a flat piece of metal together, when in a heated state, and so forming a tube; but, notwithstanding the great skill displayed in their manufacture, they are more or less open to the objections attaching to the use of all welded metals subjected to great heat or great pressure, and sometimes both combined. The weld is the weakest part, and it is there the first defect makes its appearance. Gun barrels are now made, to a small extent, of steel, but as these are drilled out of the solid bar, they are tedious to manufacture, and necessarily expensive. The new machine is highly efficient in operation, and consists of two large cast-iron cylinders, 11 feet long, placed opposite each other, and separated by a ram of 10-feet travel, which is driven out of the one and into the other alternately. On each end of the cylinders is a massive flange, pierced with eight holes, some 4 in. across; on the ram is a similar flange, but double, offering eight similar holes to each cylinder. The diameter of this hydraulic ram is 16½ in., and the force obtainable upwards of 600 tons. In working, a draw-plate or die of a peculiar form is placed in one of the holes in an inner flange of one of the cylinders, and the tube to be drawn (of which there may be eight each time), slightly tapered at the end to allow of its passing in the die, is placed therein, having previously received a steel-headed mandril, intended to act on the interior of the tube. The tube is fixed on the flange of the ram, by means of a screw pin projecting through the flange of the cylinder, and the stem of the mandril is fastened to the further end of the cylinder. The water being forced into the cylinder, the ram is driven forward, and the tube is drawn bodily through the die, or draw-plate, and over the mandril, the head of which, inside the tube, is placed exactly within the circle of contact of the die outside. By this means the tube is drawn externally and internally at the same time, and ⅛ in. of steel may be displaced from the surface at one draw, the tube being elongated proportionately; but in practice it is found more convenient to take off less at each draw, in order to avoid fatiguing the metal unnecessarily. The process possesses so many advantages, as compared with those at present in use, that the company in course of formation for developing the invention may fairly expect to find favour with the public.

PERFECTION OF THE PRINTING TELEGRAPH.—Telegraphy has now become so extensively adopted amongst the commercial classes of the country as to be regarded as an indispensable necessity to ordinary business, the natural consequence being that any improvement in the means of securing economy and accuracy in the despatches is regarded with quite as much interest by the general public as the man of science. The amount of accuracy already attained is, considering the imperfect appliances that have hitherto been at disposal, beyond all praise; but, owing to the circumstance that telegrams are necessarily concise, the smallest possible error may lead to almost incalculable inconvenience. It has been the knowledge of this fact that has induced the strennous efforts of ingenious inventors to provide a means of telegraphing which shall enable the message to be delivered to the senders in a legible form precisely as transmitted by the instrument, thus avoiding the possibility of errors in reading the instrument or transcribing the message, and Bonelli, the well-known Italian electrician, has at length succeeded in providing the desideratum. It is unnecessary to trace the history of electric telegraphy from the time when Grey and Wheeler, in 1729, first observed the instantaneous discharge of electricity through some hundreds of feet of wire, or when Winckler of Leipzic, Nollet Lemonnier of Paris, and Bishop Watson of Llandaff, some 20 years after, succeeded in transmitting currents through wire a distance of more than two miles, yet it will not be uninteresting to mention a few of the inventions which have from time to time attracted attention, with a view to show the advances that have been made, and prove that important improvements are not impossible. Passing over Strada's account of the existence of a magnetic telegraph previous to the 16th century, the first real attempt to render electricity available for the transmission of signals appears to have been that of Lesage, a Frenchman, who in 1774 establish an electric telegraphic at Geneva, with 24 conducting wires, to correspond with the letters of the alphabet, each conducting wire communicating with a distinct electrometer, formed of a small ball of elder, suspended by a wire. Now, at this time the transmission of a word a minute on the average for a quarter of an hour would have been regarded as a feat which could scarcely have been accomplished by anything short of a miracle, yet at present we hear of messages being transmitted at the rate of 40 words a minute by the ordinary needle telegraph, and are still dissatisfied with the speed attained—to remove the cause of dissatisfaction, Bonelli offers us a system which shall enable us to have direct from the instruments messages as legible as an ordinary newspaper at the rate of 1000 words per minute, and as an influential company has been formed for developing the invention in this country, it may reasonably be anticipated that before many months have passed all our great commercial towns will be placed in direct communication by Bonelli's printing telegraphic system. The idea of printing telegraphs is almost as old as telegraphy itself, the telegraphs of Morse, Bain, Bakewell, and a host of other early inventors, being printing telegraphs, but there have always been objections to them, which have prevented their adoption—either the number of wires necessary has been too large to be practicable, or their accuracy could not be depended upon, or the printing could only be read by the receiver, and caused the needle instrument to remain in favour. These objections Bonelli seems entirely to have removed: he prints the message at the transmission end of the line, he uses five wires only, and inaccuracy is practically impossible. The transmitting and receiving instruments are similar in appearance; each consists of a table about 6 ft. long and 1½ ft. wide, along the centre of which runs a miniature railway, terminated at the end by a spring-buffer, and spanned midway by a bridge about 6 in. high and 3 in. wide. Upon this railway is placed a wagon, about 3 ft. long, and 5 in. wide, 3½ in height, running upon four wheels; on the surface of this wagon are two long rectilinear openings—the one opening the forward half, and destined to carry the message which is to be sent, the other occupying the latter half, and intended for the message to be received; upon the bridge are two small metal combs, each containing five insulated teeth, answering in number to, and connected with, the insulated conductors of which the line is formed. The combs differ from one another, the one which is to dispatch the message, formed of teeth, having a certain freedom of action, is on the side of the bridge farthest from the operator; the other, or writing comb, consists of a similar number of teeth fixed in a block of ivory, and forms a perfect line, resting with a slight but regular pressure transversely on the paper.

The message to be transmitted is set up in type, and, when a line the length of the opening in the carriage is finished, placed on the wagon, which now stands at the upper end of the rail, and is held there by a simple catch, and in the second opening he places a plate of metal, upon which has been laid a few strips of paper prepared with a solution of nitrate of manganese: this done, he turns a small handle, and the wagon being at once freed from the catch, is set in motion by a simple weight, the pace being regulated by a fan; the type is thus brought under the action of the despatching comb, and runs lightly under its teeth from end oo end; one-half of the journey being made, the writing comb comes in contact with the prepared paper. If the operator at the other end has had a message to send it will have been printed in clear legible characters, of a deep brown colour, the form of the letters usually corresponding exactly with that of the type from which it is transmitted; and it is to the circumstance that exact correspondence between the two instruments is not absolutely necessary that the great value of the Bonelli telegraph, as compared with other printing telegraphs, is to be attributed. With the majority of printing telegraphs the synchronism of the transmitting and receiving instruments must be absolutely perfect, or the message will be unintelligible, since an S transmitted may be recorded R or T, through the slightest possible deviation in the speed of the two instruments; but with Bonelli's system this evil does not exist, the sole inconvenience of difference of speed being a trifling difference in the form of the letters recorded—thus, if the transmitting wagon move too quickly, the letters recorded will have a longitudinally compressed form, whilst if it moves too slowly, the recorded letters will be widened, but in all cases they are received and legible. It is proposed, as we understand, to reduce the tariff to the uniform rate of 6d. per message of 20 words, so that the enterprise is unusually well entitled to general favour.

MASTERPIECES OF INDUSTHAL ART AND SCULPTURE—No. II.

The arts constitute the highest point of man's sub-creativeness. Through the human medium Nature is in them reflected, and operates, in the first instance, by presenting types to the sympathies; and, secondly, in indicating material for the supply of those composite utilities which are the requirements of the civilised state. They are at once, under the mental influence, the elements and sustenance of progress, a truth impressed more and more upon the mind by every resumption of the study—a most important one—of the illustrated volumes now under consideration. Our former notice concluded with a reference *currente calamo*, to Plate 82, which exhibits a silver table and mirror, by Messrs. ELKINGTON and Co., London. Of the beauty of design and exquisiteness of facture this illustration records, mention has already been made, and we, therefore, pass on to the interesting description given by the author, of whose literary ability there is to be found throughout this vast work evidence of a very high order. Mr. WARING must have burnt the "midnight oil" for many months in laborious research after the artistic and biographical lore with which he has enriched those pages. As a literary production it is invaluable, not only to manufacturers and students, but to all whose business or amusement it is to write and print their thoughts and opinions. There is, in a word, no department of literature in which Mr. WARING'S writing cannot command a prominent place, and where the perseverance and cleverness it gives proof of will not afford a very worthy and distinguished example. To him, single-handed, is the literary world indebted for the letterpress matter which adds so essentially to the intrinsic merits of the master-pieces of industrial art, and when it is considered that the anxious labour of correcting the French translation was performed by him, it must be acknowledged he has wrought well and faithfully in the cause of the arts and sciences.

Somewhat of melancholy interest is attached to this silver table and mirror. The two silver candelabra on the table were modelled by "the late EBILE JEANNEST, from a design suggested by H.R.H. the late PRINCE CONSORT, being a portion of a set used at Balmoral." A striking feature, and one especially suggestive of Scottish association, is the introduction of a plaid, in pendent folds of a strap-like character, from the arms of the three lights, these arms partaking of the Celtic ornaments found in Ireland and Scotland. The silver equestrian statuette of Lady GODIVA was also modelled by M. JEANNEST, and was presented to Prince ALBERT by Her MAJESTY, who has so devotedly and devotionally consecrated the severance death makes between human hearts by the holiest and deepest sorrow. Mr. WARING refers to the great antiquity of furniture made of the precious metals, and quotes from "EGINHARD'S Life of CHARLEMAGNE" in proof, it being therein asserted that the EMPEROR was possessed of three silver tables and one of gold, ornamented with views of the cities of Rome and Constantinople. Mention is also appropriately made of a silver table sent to the BLACK PRINCE by DON PEDRO, of Castile, but we may add that even in this country, as early as the eleventh century, "the Anglo-Saxons' housou sehold articles *de luxe* of this type, and of various others fancifully wrought, were not unknown."

After the enumeration of other instances of this species of ancient manufacture, such as the silver *repoussé* table which the City of London presented to CHARLES II., now preserved at Windsor Castle; and a table, mirrors, candelabra, and sconces, in *repoussé* silver, factured in the seventeenth century (A. D. 1660), at present at Knowle, in Kent, the author pertinently remarks—"The Messrs. ELKINGTON, by the Alhambresque table and mirror, and the beautiful silver-chased table of M. MBEL-LADEUIL, appear likely to bring these costly works again into fashion." Taking, hence, a retrograde reference, Plate 2 sets before us a Reredos, by T. EARP, designed by J. BENTLEY, architect. It is composed of Caen stone up to the super-altar, which is constructed of Isle of Man black limestone, oil-polished. This work, for ecclesiastical use, is ornamentally allegorical: the Virtues overcoming the Vices form the main subject; and, altogether, it is a worthy and ingenious proof of our national artistic advancement.

Plate 6.—French Ornamented Firearms.—These *armæ de luxe* are, in the words of the Jury report, "chiefly remarkable for the extreme artistic beauty of their decorations," the most eminent makers being DEVISME and LEPAGE-MOUTIER, GASTINE RENETTE, CLAUDIN BRUN, PERRIN, and THOMAS, all of whom received, as exhibitors, the highest commendations.

Plate 11.—A sideboard by Messrs. JACKSON and GRAHAM, London. The great sideboard, in British oak, says the report, decorated with figures, subjects, and attributes, is executed with rare perfection. This eminent firm could not possess a more enduring testimony of what it can execute in this particular branch of industry than the illustration above numbered.

Plate 15.—Ornamental Cast-Iron Panel, exhibited by the Friedrick Wilhelms Joint-Stock Mining Company at Mulheim, on the Ruhr, near Dusseldorf, in Prussia. The principal feature here is that the casting had neither been touched nor dressed after coming from the blast-furnace. It will be instructive to cite the recorded opinion of the Jury on this specimen of iron manufacture in the Exhibition Report of 1851. Alluding to the productions of France, Belgium, Austria, and Prussia, it went to show that "the iron-castings from those countries display a sharpness, clearness, and closeness of texture, and a good taste and intelligence in design, which afford much reason to doubt whether any pre-eminence can be accorded to this country, except so far as mere quantity is concerned." Ten years and more have passed away, and what is the amount of improvement we as a nation can give ourselves credit for in this particular foundry production? In the words of Mr. WARING, "Our manufacturers have benefited by the advice, and largely employed some of the first designers and architects of the day, both for cast and wrought ironwork, yet for mere ornamental purposes there is still a something wanting in our designs when compared with those of the Continent. There is a play, a fancy, a variety about these which we miss in the more solid and somewhat monotonous character of our own productions; and it is precisely in cast-iron that this richness, even exuberance of fancy, is admissible; for the material is ductile, and to be moulded without injury to its nature into the most complicated designs that moulds may produce." And here follows an educational suggestion, not without its important bearings on artistic studentship. "For this purpose a purely architectural education, or even that of our Schools of Design, is too restricted within certain limits, bound by certain dogmas, and trammelled by set ideas."

Thus the author boldly, and we feel truly, tells us an expansion and elevation of the educational principle in this phase of the arts is required, and strongly recommends to the student and aspiring manufacturer to try a tour in Germany, and take a leaf out of the inventive-book of our stolid cousins; and, thus conveys the counsel, "there, in the churches and museums, may be seen and studied some of the finest specimens of the smiths and founders' arts. France and Holland, and England also, have suffered, during revolutions and wars, the loss of most of their best examples; but, if circumstances admit, the student will find all he can desire in Germany, of a very peculiar and very good class, both for design and execution, to which we would strongly direct his attention." Such are not mere words of course; they carry with them a tone and substance of utility, and, as we shall again recur to this most excellent publication, we shall not fail to give our manufacturing readers of every class the benefit of its author's appropriately-expressed and well-considered opinions.

THE INDUSTRIAL RESOURCES OF THE TYNE, WEAR, AND TEES DISTRICTS.—A volume, at once handsome, useful, and interesting, has just been issued under this title,* and as the information contained in it has been contributed by gentlemen personally and intimately connected with the branches of industry treated of, it will be apparent that the book will form a valuable text-book far beyond the district to which it particularly relates. It appears that in the year 1855 the late Mr. Thos. J. Taylor and Dr. Richardson commenced to collect information connected with the introduction into the district of the various manufactures for which it is now so celebrated, the numerous improvements which had their origin there, and the development of the different mining and manufacturing industries within a recent period. The death of Mr. Taylor suspended the execution of the work for a time, but the visit of the British Association to Newcastle was deemed a fitting occasion to complete the task, and the willing co-operation of various gentlemen has resulted in the production of the several reports which constitute the volume. The locality is peculiarly rich in these records, inasmuch as it is the birthplace of the locomotive and the railway system, which has received such development there that there are now three linear miles of railway for every square mile of surface: it has witnessed the introduction of the glass, alum, and soda trades, which were all first commenced in that district; it was there that Stephenson invented his safety-lamp, and Pattinson the desilverising of lead; whilst Buddle perfected the furnace ventilation of mines: and, lastly, the country owes a valuable arm of defence to the ingenuity of Sir W. Armstrong, of Elswick. It is considered that the extraordinary advantages of the district are only now being recognised. There are six harbours within 54 miles of coast for its shipping; every variety of fuel—steam, gas, coking, and household coal in the same basin; magnesian and mountain limestones, with cheap imports of chalk, furnishing supplies of lime for its chemical and metallurgical operations; immense deposits of fire-clay, providing for all the demands of its furnaces; and inexhaustible beds of argillaceous and calcareous iron ores, with hematites of the best description, form the durable basis of its extending trade and commerce. The recent discovery of the bed of rock-salt at Middlesbro' will ere long add salt to its lists of available mineral riches. The enterprise of its inhabitants is not, however, confined to the mere raising and export of some of its mineral treasures, as 20,000 tons of lead, 550,000 tons of iron, 170,000 tons of chemicals, and 300,000 tons of clay wares, in addition to its glass and paper, are annually manufactured on the banks of its rivers. The district can also point to the celebrated engineering and shipbuilding factories of Stephenson, Hawthorn, Armstrong, Palmer, Bell, and many others, whose locomotives and engines, hydraulic machinery, guns, and ships, have acquired a European reputation. The annual value of the mining and manufactured products which the district yields exceeds 17,000,000*l.*—coals figuring for 6,650,471*l.*; metallurgical products, 3,707,941*l.*; chemical manufactures, 1,583,220*l.*; paper, 300,000*l.*; leather, 135,659*l.*; glass and clay wares, 1,066,650*l.*; iron shipbuilding, 1,643,328*l.*; and engines and machinery, 1,928,600*l.* This, with the value of the shipping, with cargoes outwards and inwards, will give some idea of the industrial resources of the district. The shipping trade of the districts is enormous, nearly one-fourth of the outward trade of the entire kingdom being carried on from the ports within it. The total tonnage in 1862 of its coasting and foreign trades was inwards, 1,250,274 tons; outwards, 7,326,796 tons. The volume very appropriately opens with Sir W. Armstrong's address to the British Association, which forms the introduction to the several reports, which comprise that on Coal, Coke, and Coal Mining, by Messrs. Nicholas Wood, J. Taylor, and J. Marley; those on the metallurgy of the District (including Iron, by Mr. I. L. Bell; Steel, by Mr. T. Spencer; Lead and Silver, Copper, Zinc, and Antimony, by Dr. Richardson and Mr. Thomas Sopwith; and Aluminium, by Mr. J. L. Bell); that on the Chemical Manufactures of the District, by Dr. Richardson and Messrs. Stevenson and Clapham; the report on the Vitreous and Ceramic Manufactures of the District (including Glass, by Mr. R. W. Swinburne; Earthenware, by Mr. T. C. Maling; and Fire-clay Wares, by Mr. J. Cowen); that on the Manufacture of Paper, by Mr. W. H. Richardson; that on the Tanning Trade of Newcastle and Gateshead, by the late T. C. Angus; that on the Construction of Iron Ships, and the Progress of Iron Shipbuilding on the Tyne, the Wear, and the Tees, by Mr. C. M. Palmer; the report on the Engineering Manufactures of the District, by Messrs. Westmacott and Spencer; that on the Railways and Locomotives of the Districts adjoining the Rivers Tyne, Wear, and Tees; and that on the Improvements introduced in the Rivers of the District, which is sub-divided into the Tyne by Mr. Ure, and the Tees by Mr. Fowler. The work is beautifully illustrated with about 30 plates, comprising engravings executed in the best possible manner, and chromo-lithographic maps, plans, and sections, produced in that admirable style for which Newcastle-on-Tyne has so long been celebrated. The volume is of especial value to all interested in the locality, and is well worthy of perusal by commercial men generally, from the enormous amount of interesting matter it contains, and it is one which will at the same time be an ornament to any library in which it may find a place.

* "The Industrial Resources of the Three Northern Rivers, the Tyne, Wear, and Tees, including the Reports on the Local Manufactures read before the British Association in 1863." Edited by Sir W. ARMSTRONG, Messrs. I. LOWTHIAN BELL and JOHN TAYLOR, and Dr. RICHARDSON. London: Longman and Co.

THE USEFUL METALS AND THEIR ALLOYS.—The third thousand of this valuable little volume is now being issued by Messrs. Houlston and Wright, of Paternoster row, and from its undoubted value as a text-book for the practical man, it is likely to pass through many further editions. The work is divided into 30 chapters, comprising treatises on metallurgic chemistry, special metallurgic operations, vegetable and mineral fuel, special characteristics of iron, draining mines, mining jurisprudence, history of British metallurgy, iron ores and their conversion, fuel used in the manufacture of iron, calcination and smelting of iron ores, moulding and foundling properties of cast-iron, manufacture of wrought-iron, recently patented refining processes, metals which alloy with iron, wrought-iron in large masses, steel manufacture, application of steel to various purposes, of cast-iron to the manufacture of ordnance, and of iron to machinery, architecture, shipbuilding, &c.; as well as copper, tin, zinc, antimony, bismuth, and lead, with their applications to the industrial arts. The chapters on metallurgic chemistry and assaying are by Dr. Scoffern. Those on mining, mining ventilation, and jurisprudence were written for the work by a Government Inspector of Mines. The chapters on iron and the several processes used in its conversion have been prepared by the late Mr. Truran, C.E., author of the "History of British Iron Manufacture," and for many years engineer at the Dowlais, Hirwain, and Forest Ironworks, under Sir John Guest and Mr. Crawshay. Mr. Clay, of the Mersey Iron and Steel Works, has described the processes and tools necessary for working malleable iron in large masses, including the details connected with the large wrought-iron gun presented to the nation by that company. The paper on steel manufacture is said to be by a gentleman of great practical experience, who wishes to remain unknown. Mr. Wm. Fairbairn, F.R.S., has contributed valuable information on the application of iron to the purposes of ordnance, machinery, bridges, and to house and shipbuilding. Mr. Wm. Vose Pickett has given a summary of his new system of iron architecture, a subject to which public attention has already been very considerably directed. The chapters on iron working for use and ornament, and the manipulation and construction of ornamental ironwork, are by Mr. W. C. Aitkin, of the Cambridge Works, Birmingham. Those on copper, tin, zinc, and antimony are by Mr. Oxland, of Plymouth, with the exception of the portions on copper and tin mining, which are partly by Mr. Truran and partly by Mr. Oxland. The information contained in the work is rendered particularly lucid by the numerous illustrations which accompany it, rendering it one of the most valuable works extant.

THEATRE OF WAR IN SCHLESWIG.—Mr. Wyld, geographer to the Queen, has just issued a map of great political as well as topographical interest. Ever utilising the powers at his command for the public benefit, *pro bono publico*, Mr. Wyld does in the present instance not not only convey information in a general way, but he lays down for the especial guide of Members of Parliament, and all who are diplomatically engaged, a chart by which all may be guided through the territorial intricacies of the Dano-Germanic question. One word more would mar the opinion we wish to record. Enough that no man, whether literary, amateur, or official, should be without this tracing of a country, the political position of which at the present moment involves the peace of Europe.

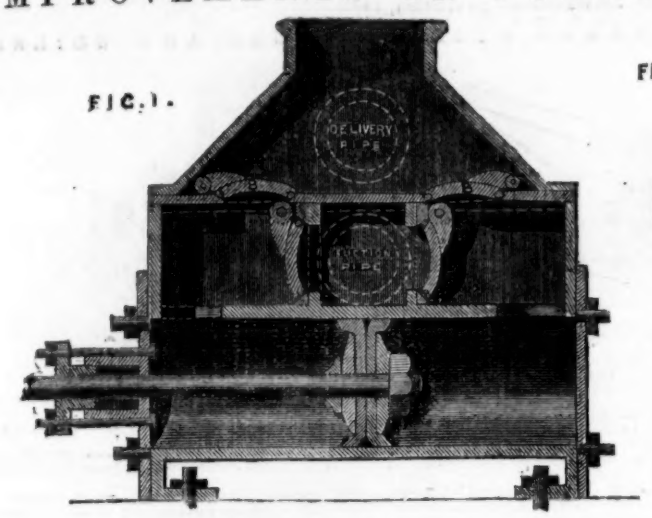
THE SUGAR QUESTION.—An interesting pamphlet, pointing out the necessity for the equalisation of our sugar duties, has just been published (through Messrs. Longman) by Messrs. JOSEPH TRAVERS and SONS, the well-known wholesale grocers. It is clearly shown that the variation of the duty upon the several classes of sugar is unjustifiable, owing to the classification being bad and complicated, and that a tariff based on such subtle distinctions as that now in use must in the application raise the greatest difficulties, and annihilate the value of that improved process of manufacture which the English Government, by fixing a single duty on free and slave grown sugars, had induced the colonies to adopt. Whilst America, Holland, Belgium, the Zollverein, Russia, Spain, the Cape, and other countries, distinguish only raw and refined sugar, and Australia has one uniform duty for sugars of all descriptions, England has retained the graduated scale to the present day, and recognises four standards, although it is admitted to be impossible to distinguish the slight difference which separates an inferior quality from the one just above it, though that difference involves 2s. 4d. variation in the duty. It is shown that identical parcels of sugar are now sometimes assessed at one duty at one port and at another duty at another. The Mauritius sugar-growers say they can furnish the public with a much finer quality of sugar at the same price as that which it costs them to produce a comparatively inferior description; but that they are compelled to keep the quality down to a certain point, and sometimes actually to resort to an extra and special process for the purpose, because such improvements of quality would, under the existing differential scale, subject their goods to an increased duty of 2s. 2d. per cwt. Supposing the better class of sugar they could send to be worth intrinsically only 1s. 6d. more that which they actually send, the 2s. 2d. extra duty would cause them to sustain a heavy loss by the operation. The West Indian growers, on the other hand, in consequence of deficient skill, capital, or enterprise, can only compete with those of Mauritius in the inferior sorts. Hence the differential duties act upon their interests as a direct protection, which is paid out of the pockets of the English consumer. But the productive operation does not stop here. Of course, in proportion to the inferiority of the sugar imported is the necessity for the action of the refiner in this country. The Mauritius planter would actually send his sugar in a refined, or nearly refined, state if the market were open at the same duty for all qualities. The tariff, however, shuts him out from such competition with our refineries, and thus gives a protection to that class of establishments, which are exceedingly wealthy and influential, and, in combination with the West India interests, will defend, by all parliamentary means, their existing position. It remains to be seen if, in the next session, these parties will be able to continue their taxation of the great body of the English public.

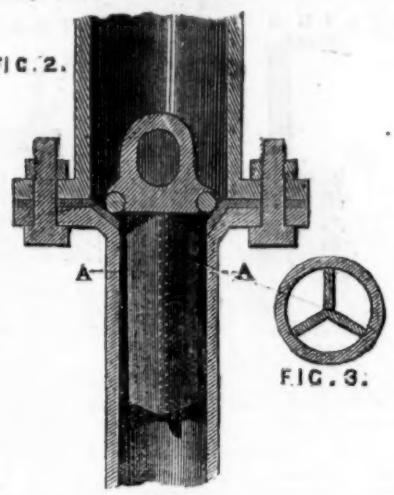
OUR FIRST IRON SHIPBUILDER.—That our present commercial greatness is attributable, to a very great extent, to the energy and ingenuity of those who have been engaged in the development of our coal and iron industries is now universally acknowledged, and the country has already recognised the services of many of our great mechanics, by awarding them a pension from the Civil List, yet our first iron shipbuilder, although old and needy, has received no consideration. The first sea-going iron vessel was built by Mr. ANDREW MORRISON, now in his eightieth year, residing at Brook Farm Cottage, Windsor, Liverpool. It was the paddle-steamer *Alburka*, 60 ft. long, 14 ft. broad, and 6 ft. deep, or of about 65 tons register. Andrew Morrison, a wooden shipwright, designed and constructed her at the boiler yard of Messrs. Fawcett, Preston, and Co., Oil-street, Liverpool, in the year 1830, and she was, when completed, conveyed on a truck drawn with horses to the north shore, where Andrew Morrison launched her. This craft, along with the wooden paddle-steamer, *Quorra*, and the brig *Columbine*, sailed from Liverpool in the summer of 1832, with the Messrs. Landers, for the Bight of Benin, West Coast of Africa, ostensibly to ascend and explore the River Niger. The *Alburka* and *Quorra* never returned to England, and finally ended their days on the beach of Africa. The *Columbine* returned to Liverpool Jan. 3, 1834, with 131 tons of Palm oil (Pulla), and 2 tons 9 cwts. of elephant tusks (ivory), for the proprietors of the Niger expedition. Now, it is urged that, inasmuch as Mr. John Laird, the maiden M.P. for Birkenhead, is well acquainted with the history and claims of Andrew Morrison, he should be the first to bestir himself in obtaining for him the recompense he so well deserves from the nation generally, and from the iron shipbuilders in particular, in order to secure him, during the few remaining years he has to live, those necessaries and comforts which his daily wants demand. By substituting iron for wood Andrew Morrison has entitled himself to the consideration of the country as a public benefactor, and it is to be hoped that he will at least receive a slight remuneration for his labours, in the shape of a pension from the Civil Service fund, the placing of Andrew Morrison's name upon which would redound to the Premier's credit, and at the same time be the means of encouraging the discoverers of other useful improvements to make known their ideas. For the granting of a pension to Andrew Morrison there is ample precedent, for he stands in the same category as Messrs. Richard Cort, Charles Mackay, George Rainy, John Seymour, Isaac Taylor, and a host of others whose names will ever be favourably remembered in connection with the history of the industrial progress of the country.

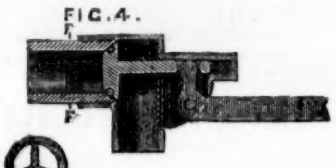
BLASTING BY ELECTRICITY.—A correspondent of the "U.S. Railroad and Mining Register," referring to the published account of the new method of blasting by electricity, invented by a Frenchman, describes that arranged by the engineer corps of the Philadelphia and Reading Railroad Company, and used during the widening of the tunnels at Phœnixville and Manayunk in the year 1859. The battery consisted of about 25 copper cells, 1 ft. long, by 18 in. deep, by 1 in. wide, open at top and bottom; these were set in a wooden frame, and separated from each other by common window glass, which was also secured in the frame; inside of each of these cells was a plate of zinc, just large enough to allow a slip of groved wood to hold it away from the copper at the ends. Each zinc plate was connected to the copper cell next to the one in which it was placed, making thus a very large voltaic pile. From each end of this battery an insulated wire ran to the holes to be fired, that from one extremity, of course, going from a copper, and the other from a zinc plate. The acid used was sulphuric, diluted in about thirty times its quantity of water. The frame was arranged to raise and lower into a wooden trough or bath, which contained the diluted acid, by a windlass, so that the person who was engaged in connecting the main wires to those in the holes did his work without any risk of an explosion, the battery not being lowered into the acid until he was at a safe distance. For firing the holes two wires were taken and twisted together. At first it was thought necessary that both should be insulated, but it was soon found that if one of them was coated with gutta-percha it was sufficient. At the end inserted into the holes these wires were separated about a quarter of an inch, and connected by a very thin piece of platinum wire; afterwards it was found that steel answered every purpose, and was much less expensive. This thin wire melted as the charge of electricity passed through it. At the commencement of the work this was inserted directly into the blasting-powder, but two great disadvantages arose therefrom—first, the danger of the small wire becoming broken in tamping the hole; and, second, the difficulty of igniting the coarse blasting-powder by the instantaneous spark of electricity; to avoid both of which a small paper-bag, large enough to hold about a gun-shot charge, was placed over the end and filled with rifle powder, the bottom being pasted, shut, and the top tied securely above the steel-wire. Another difficulty then arose from the fact that, in handling the "cartridges," as they were called, the fine powder was frequently unavoidably shaken out of them. This the men who had charge of loading the holes soon discovered, and before inserting one, would finger the little paper bag to see if it was full, and, as their hands were generally wet, injured the powder. To avoid this, gutta-percha was dissolved in ether, and the cartridge dipped into it; as soon as taken out of the mixture the volatile liquid evaporated, leaving a very thin coating of gutta-percha over the paper. Thus perfected, the "cartridge" was inserted into about the centre of the charge of blasting-powder in the hole, the opposite ends of the wires protruding, tamping was put in exactly as if fuse were used instead of wires. Before firing, a number of holes were connected together, by taking the protruding end of one wire of the first hole and twisting it to the end of one of the second, the remaining one of the second to one of the third, and so on. One of the main wires from the battery was then connected with the end of the first wire of this "batch," and the other to the end of the last; the battery was then immersed in the bath containing the acid, and the discharge of the whole lot was instantaneous and simultaneous. As many as twenty holes were frequently fired in one lot. The working of this arrangement was eminently successful. For three months an average of nearly one hundred holes a day were fired at each tunnel without a single accident, so far as the blasting was concerned. This system, you will perceive, is almost identical with the one invented in France. Many of the details, such as coating the bag with gutta-percha, &c., will be indicated by local circumstances to practical minds."

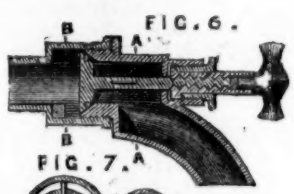
PUDDLED STEEL.—In manufacturing steel in an ordinary smelting-furnace Messrs. Brant and McElroy, of Pittsburg, propose to throw into the furnace pulverised charcoal, or other carbon, when the iron begins to granulate, and close up the furnace so as to retain the gases evolved therein.

IMPROVEMENTS IN PUMPING MACHINERY.









That efficient pumping machinery is one of the most important elements in connection with practical mining is well known, and two opinions can scarcely exist as to the desirability of a perfect and durable valve, and hence it is that we have so frequently to allude to the introduction of improved forms of valve, having for their object the securing of a thoroughly water-tight joint, and a valve which will continue to act effectively until positively worn out. With the ordinary valve a comparatively small amount of wear renders it useless, yet the very construction of the valve offers the greatest possible facilities for damage, more especially when the water is not absolutely clear, which it seldom or never is in mines, and it cannot be doubted that an invention which provides a form of valve which remains clean under all circumstances, and which even when worn does not interfere with the proper working of the valve, is a desideratum. According to the invention of Mr. John Cooper, of Town Malling, Kent, the suction-valve is constructed of one piece of metal with a circular groove, in which is inserted an elastic ring of vulcanised India rubber, or other suitable elastic material, in combination with a seating for the valve, forming an angle of about 45° with the side of the barrel. By this arrangement the valve is made to close by the resting of the elastic ring on the angular seating With reference to the buckets of pumps, Mr. Cooper proposes to form the ordinary leather packing of the bucket by binding a strip of leather round the metal, and securing it by pins passed through holes in the metal, the points or inner ends of such pins being turned down after insertion, and the leather being bevilled so as to keep the heads of the nails within the circumference of the leather packing, and this arrangement is in substitution for the ordinary mode of "cupping" the leather, and applying it to the metal by screws.

In the above diagrams Fig. 1 represents a longitudinal vertical section through the barrel, plunger, valve-chamber, and valves of a double-action pump, in which, B B, are the delivery valves, which may be made of brass or iron, with a groove formed in it to receive the ring of vulcanised India rubber, which rests on the angular seating. Fig. 2 is a vertical section through the valve part and suction-pipe of a pump, adapted for deep wells or mines. Fig. 3 is a cross section of valve-guides and suction-pipes. Fig. 4 is a longitudinal section through a single-acting bib valve, showing elastic ring, &c., as above described. Fig. 5 is a cross section through guides of valve. Fig. 6 is a longitudinal section through a ball valve. Fig. 7 is a cross section at the line B B, showing stops for valve. Fig. 8 is a cross section at the line A A, showing grooves and feather-guides to valve-spindle. It will be seen from the diagram that, by turning the T head of the tap to unscrew the same, the elastic ring which is inserted in the groove made in the valve will be lifted off the seat, and allow the water or other fluid to pass when the T head is turned in an opposite direction; the elastic ring will be brought against the seats, and close the valve, and, the pressure of water or other fluid resting on the valve, the screw of the same will be relieved of all strain. These taps may be made of iron or brass, and the screw being free from strain when the valve is closed, it will be more durable than those where the pressure is held by the screw.

The great advantage of the pump, whether used for mining or other purposes, is that the valve will be closed as required, although it may not be perfectly level with the line of its seat; and this distinguishes it from valves of ordinary construction. Mr. Cooper claims—1. The construction and use of suction-valves, composed of one piece of metal with a groove, in which is inserted a ring of elastic material, combined with an inclined valve seat; 2d. The mode of forming the leather packing of the buckets of pumps; and, lastly, the construction and use of valves or cocks with the elastic ring combined, with an inclined valve seat, and adapted and applied to various uses.

TREATING MINERAL OILS.—In the treatment of oils from shale, or other bituminous minerals, and similar oils, so as to obtain various products therefrom in a more satisfactory and profitable manner than hitherto, Mr. J. MacLean, of West Calder, proposes that the crude oils should be put into a distilling vessel, constructed and arranged so that at the commencement of operations a very low heat may be applied thoroughly to it. Hitherto it has been usual to treat such oil in apparatus of considerable depth, and on account of that depth, the heat acting directly upon the bottom, has had to be raised to such a degree to penetrate up through to the surface of the liquid, that the products corresponding to a low heat have not been obtained in a satisfactory manner. According to Mr. MacLean's invention, the distilling vessel is shaped so that the oil whilst covering an extended horizontal space occupies a comparatively small depth, and the furnace arrangements are such as to cause the direct application of heat to the entire surface of the vessel, up to or nearly up to the surface level of the oil, by which means the entire mass of the oil becomes thoroughly penetrated by a low heat. A modification of a distilling vessel, suitable for carrying out this system, is in the form of a shallow horizontal boiler, of about 7 ft. 6 in. long, by 3 ft. 6 in. broad, and 2 ft. 6 in. deep, the top, bottom, and corners being somewhat rounded. This vessel is supported upon open brickwork, above a furnace grate, which it 2 ft. wide, and which extends back about 5 ft. 6 in. under the vessel. A flue space is formed, in brickwork, all round the sides of the vessel, and up to the intended level of the oil, or nearly so, and after circulating in this flue space, the fire gases pass off by a chimney at one end. The vessel is provided with a man-hole door, and with a screw sight-hole, which is, by preference, in the man-hole door. To convey away the products of distillation, there is fitted to the top of the vessel a still-head or funnel, which is curved down into a horizontal direction as closely upon the top of the vessel as can be conveniently managed. The funnel is gradually contracted from about 12 in. to about 4 in. in diameter, and it has connected to it a considerable length of piping, (say) about 60 ft., having the very slight inclination downwards of about ½ in. to the foot. At intervals this piping is arranged with a curved piece, designed to slightly check the current of the vapour. Just as it leaves the distilling vessel the piping is passed through a cistern, into and from which cold water is filled and discharged as the operations may require. In working with the improved apparatus, the crude oil being put into the vessel, the fire beneath is very gradually raised, until a temperature of about 120° Fahr. is attained, when there distils over a light naphtha, or liquid like naphtha, which becomes condensed in the piping without cold water being put into the cistern, and is drawn at the extreme end into any suitable vessel. As the fire heat is gradually increased, turpentine, or a liquid like turpentine, is next distilled over instead of the naphtha, and is received into a separate vessel. As the heat is still gradually increased the turpentine is followed by a kind of paraffin oil, suitable for illumination, and the paraffin is followed by an oil which, when purified, is suitable for lubricating purposes. These two oils require cold water to be put into the cistern to effect their condensation. Upon these oils being drawn off, the residue is taken out of the distilling vessel, and may be used for various useful purposes, such as for manufacturing black paint, or printing ink. The paraffin oil is purified by treatment with strong sulphuric acid, and by re-distillation, once again or oftener. The lubricating oil is also purified by means of sulphuric acid and re-distillation, when there separates from it a thicker oil or grease, which may likewise be used for some lubricating purposes.

METALLIC PISTONS.—Mr. G. Saxon, of Openshaw, proposes to cause both the rings and springs to be free to revolve around the circumference of the cylinder in whatever part they may be placed, so that the force of gravity shall have no more effect upon them in any one position than in another. This he accomplishes by forming the taper springs with additional projections, placed in such situations that each spring shall be evenly balanced, and thus be enabled to rotate round the central axis of the cylinder. These projections may be placed either on the inner, outer, or both surfaces of the springs, whilst the strength of the spring is still reduced from the back, or heel, towards the point, so as to produce a uniform pressure on the outer rings, and the circumference of the cylinder, when they are placed in an angular or horizontal position.

IMPROVEMENTS IN TIN-PLATES.—In the process usually employed for preparing plates, bars, or other objects of iron for being plated or coated with tin or its alloys, the oxide and the cinders and other impurities adhering to the plates, bars, or other objects are removed by the action of sulphuric acid only, whereby not only a very considerable outlay is involved, but the plates or other objects made of certain qualities of iron become corroded in the shape of minute perforations. The improvements patented by Mr. T. F. Parsons, of Maindû, although relating chiefly to the preparation of plates and other objects intended to be coated with tin or its alloys, are likewise applicable where copper, zinc, lead, or their alloys are intended to be used; and the said improvements consist in firstly immersing the plates or other objects in a weak solution of sulphuric acid, simply for the purpose of loosening the oxide, cinders, and other impurities, and in subsequently completely removing them, and thoroughly cleaning the plates or other objects by scraping or grinding the same. For grinding the plates or bars he proposes to employ either horizontally or vertically revolving stones, discs, or plates of copper, lead, or other suitable metals or material acting through the instrumentality of sand, emery, or other equivalent substances, the plates or other objects being fixed or held in suitable frames or holders. A to-and-fro, or reciprocating, movement may be imparted to these revolving grindstones or discs, whilst the plate under operation remains stationary; or such motion may be imparted to the plate, the scraping or grinding instrument remaining stationary. Such parts of the plates, bars, or other objects as may not be accessible to the revolving discs may be scraped by hand by steel scrapers. The machine or apparatus which he has by experience found to be most suitable for grinding the plates, and for effectually removing from them the oxide, cinders, and other impurities after they have been, in accordance with his improved process, immersed in a dilution of sulphuric acid, is constructed thus:—The mechanism consists of two pairs of grinding cylinders or discs, revolving at a considerable velocity, the two discs of each pair being so placed one above the other that their respective points of contact shall be in the same plane. The plates to be operated upon are held fast, and passed to the first pair of grinding discs by a pair of feed rollers, whose circumferential velocity is such as to allow the grinding discs sufficient time for action. As the plate emerges from this first pair of grinding discs, it enters and is taken hold of by a second pair of feed and guide rollers, which will pass it on to the second pair of grinding discs, and passing through these it will be seized by a third pair of guide or delivery rollers. The circumferential speed of the several guide rollers is the same. The first set of grinding discs is coated or supplied with what is called No. 1 emery, and the second or finishing set with emery powder. The grinding discs, as well as the guide rollers, are made adjustable, to suit various thicknesses of plates, and the guide rollers are weighted to such an extent as may be necessary for holding the plate steady whilst under the operation of grinding. The guide rollers are placed in such close proximity to the grinding discs that the plate will always be held by at least one pair of guide rollers.

PURIFYING MINERAL OILS.—According to the invention of Mr. P. A. Godefroy, of Homerton, a tank to contain the oil in its unpurified condition is to be provided, capable of bearing high-pressure steam-power. Connected with the tank at one end, and at the other with a still, there should be a strong iron spiral tube or worm passing through the furnace, with a tap at each connection with tap and still, and by means of high-pressure steam entering the tank, the unpurified oil, by the pressure, is forced out of the tank through the heated spiral tubing, the taps being opened to allow it to pass into the still. In passing through the tube at the high temperature to which the furnace brings it, the dense thickening impurities usually found in mineral and other oils are separated from the oil, and partially deposited upon the metal of the worm, and the residue coming with the oil, easily goes into the still, where it falls to the bottom.

THE "BARTOLA PROCESS" OF TREATING ORES IN COLORADO.—The ores designed for treatment are received at the side door of the mill, in a room of 200 tons capacity. Thence they are introduced in the laboratory, where they are, by the aid of steam, subjected to a chemical treatment, of which Mr. Kenyon, probably, knows more than we. Its general effect, however, is at a trifling expense the same as that produced by the action of the atmosphere. All millmen have remarked that ores, by being exposed to the weather, undergo a change which frees the gold, increasing their product from 25 to 50 per cent., according to the length of the slacking process. The secret of the treatment under consideration consists in neutralising, by the use of chemicals, all poisonous substances in the ores, and transforming the sulphur from an antagonist to an assistant. From the laboratory the material is passed to the mill-room. There are 12 mills ranged in line through the building. Each mill consists of two cast-iron pans; one 46 in. in diameter by 8 in. deep—the other about half as large. In the centre of each pan is a shaft or spindle, to which is attached an arm and "mullers," which make 16 revolutions per minute. The shoes of these are a hard, gritty granite, procured in Eureka Gulch. It is thought they are superior to the two iron muller surfaces of the Freiberg amalgamator. Syphons connect each pair of large and small pans. We doubt whether the small ones will be found of much use. The pans are really arastras. Each is driven by a separate belt, running from a continuous line of shafting, thus acting independently of the others. Their capacity is three-fourths of a ton each per day. When in motion they present the most attractive appearance of any gold-saving machinery we have yet seen. The construction of the main mill is such that the entire gearing is underneath, and very simple, requiring but a small motive-power. So far as this thing—process and mill—are concerned, it is quite the general impression that it has only to go to work and do well. As we understand it, numerous experiments have already demonstrated its correctness and feasibility. It is claimed that it will save 90 per cent. of the gold actually in the rock. If so, a new era is about to dawn on us. Ore can be delivered at the mill at an average cost of from $6 to $8 per ton. Assays from different mines on various lodes in almost every mining district in the territory give from $100 to $300, and even $500 per ton. If the Bartola process, or Dr. Keith's process, or the two together, will save 90 per cent. of the gold present in the ore, it follows that Colorado is soon to be in fact, what she has long claimed to be, the richest mining region known in the world. Immense fortunes will be acquired with little trouble. Those attracted here in future will have the advantage of the experience acquired by the community during four years of perplexing and expensive operations, and the means to use it. We shall no longer grope in the dark. Gold mining will become what many now claim for it, as safe and permanent as any other business. Ten thousand tons of tailings are piled round our mills awaiting manipulation. They vary in value as much as the original ores, but the poorest will amply repay the working. We trust we shall be able to chronicle, inside of a month, the full success of the Bartola process and mill, the establishment of the Kenyon Mining Company being now prepared to commence operations. In the event of the success of their present enterprise, Messrs. Kenyon and Shaffer will establish similar works upon extensive mining property owned by them in Clear Creek county during the coming spring. Mr. Bartola and his associates, including gentlemen in New York of the highest respectability and wealth, are fortunate in having interested, for the introduction and development of their mills in Colorado, men of their experience and determination.—*Colorado Mining Journal*, Dec. 26.

NOVEL APPLICATION OF STEATITE.—It appears that soapstone stoves have recently been introduced at Quebec, and it is stated that they throw out mellower and more uniform heat than iron.

FOREIGN MINES.

ST. JOHN DEL REY.—The directors have received, by telegram, from Lisbon, the following, dated Morro Velho, Jan. 29:—Produce, 11 days of Jan., 12,701 oits.; yield, 6·138 oits. per ton. Remittance, 80,509 oits.; working regularly, doing good duty.

UNITED MEXICAN.—Guanaxuato, Jan. 19: Mine of Jesus Maria y Jose: The new frente of San Juan, on the original vein, and the contracielo continue in a very favourable state, and produce much ore. A cross-cut to intersect this vein at a higher level is in progress, in the hope that the ore will be found to extend upwards; it is necessary also for ventilation. The works of San Cristobal, St. Toribio, and La Trinidad are yielding a fair amount of ore. The cross-cut of San Carlos, driven from the lowest point of the shaft, has advanced 5¼ varas during the month. The buscones in the four weeks have obtained 2660 cargas, sold for $13,135, half on the mine account; and the regular miners have extracted 4955 cargas, sent to the haciendas for reduction. The mine profits on three months to the end of December amount to $11,837, of which $[illegible] are payable to the owners. The profits have been good during the year on the haciendas, though the high price of pasturas (fodder, &c.) for some months has been a great drawback.—Mine of La Trinidad: A busconе having applied for a campo on the gold costra, in a part where it was quite poor, and as his work would keep up the company's rights at a very trifling cost, his request was acceded to. Since he began work the campo has improved, and on Thursday the ore extracted during the three weeks was sold for $131.

MARIQUITA AND NEW GRANADA.—Santa Ana Mine, Jan. 6: In the 110 end north the lode is about 5 ft. wide, producing little dry stamps mineral; suspended for the present, as the men are wanted at other stations. In the stope in bottom of the 100, north of winze, the lode is about 7 ft. 6 in. wide, and very rich throughout, with branches of grey and red silver—set at $75 per fm. In the stope in bottom of the 110, south of winze, the lode is about 11 ft. wide, producing rich dry stamps mineral; no change in its character since my last—set at $65 per fm. In the stope in back of the 110, north of winze, the lode is about 6½ ft. wide, producing rich branches of pyrites, grey and red silver—set at $45 per fathom. In the stope in back of the 80, north of flookan, the lode is about 2 feet wide, producing good and stamps mineral. The men belonging to this station have also been employed driving a cross-cut on the flookan in the 80, to communicate to the new shaft for ventilation, and for wheeling mineral to be drawn by new whim-machine from the above stope. The new shaft was sunk 3 feet last month below the 100; the ground is rather hard for sinking, and being a little wet makes the progress slow, as the natives are not acquainted with wet ground. We hope to communicate the shaft to the 110 in about two months from this time, as the rise is progressing favourably. The skip-road will be completed in time for the whim-machine, if all be well. In the 70 cross-cut, west of north, on the flookan, the ground is easy for driving, and there is no change in its appearance since my last—set at $25 per fm.—Birchall's Lode; At this station we have intersected another branch of Santa Barbara lode, about 15 in. wide, containing a little silver. As we are driving west on Birchall's lode it is opening out well, being at present about 3 ft. wide, with a very kindly appearance to make mineral if properly developed. The east lode is about 3 ft. wide. No change to notice since my last. The superintendent writes that he is unable to complete the profit and loss account for October, owing to several items not being completed.

COPIAPO.—George Matthews, Jan. 15: Checo Mine: The lode in the end driving east, in the 60 fathom level, east of Price's shaft, is much the same as when last reported—still poor. The lode in the 65 chiffon, sinking east, since our last report, has made a slight improvement, being now 3 feet wide, producing 4 tons of 25 per cent. ore to the fathom, and looking favourable for an improvement. In the 65 chiffon, sinking west, there is no alteration since our last report. The lode in the end, driving west, in the 50 fathom level, east of Price's shaft, continues the same as when last reported—poor. In No. 2 chiffon, sinking west, in the 50, the lode has split in branches, and very much disordered, but we hope for its improving. In the chiffon in the 40 fathom level, west of Price's shaft, we have an alteration since our last report: the lode is now 6 feet wide, yielding some very good stones of ore and mundic; it still continues damp. The lode in the 40 winze, west of Price's shaft, is producing some good stones of ore, but not to value. In the 80, at Harman's shaft, the cross-cut driving north we have stopped, and have commenced to drive a cross-cut south, to see if we can meet with any part of the lode on that side. In the 60, at Price's shaft, the plat is almost completed, and we shall commence to sink in the space of a few days. The lode in the chiffon in the eastern new ground still represents the same appearance. The chiffon sinking west, in the western sett, in the 10, east of new shaft, still continues unprofitable. The lode in the shaft sinking under the 30 is poor. The lode in No. 2 chiffon is also poor: we have great hopes of its improving. The lode in the chiffon in the western new ground is still poor. Number of men employed in December, 1863—Englishmen, 10; natives, 93: total, 103, at 30·14.—Remarks: Every 15 days we shall add on to our reports the number of yards worked in levels, chiffons, and shafts, within the mentioned space of time.

PACHUCA.—Capt. Peull, Jan. 24: The lode in La Cruz level east is very much improved since my last, the jabones and bronce assaying 3 marcs (18 ozs. of silver per ton); and the quartz, with blue pintas and greens, 6 marcs per montom (36 ozs. of silver per ton); as we get further east in the hill I expect the ley will increase. We have cut a branch 8 in. wide in San Juan end of calcareous spar, nearly perpendicular; I expect the main part of the lode has got a greater underlie than it shows at surface, otherwise we should have cut it before this. The lode in San Luis east is getting wider every vara, and more promising, producing very kindly stuff; we have about 11 varas to reach the old shaft, of which we have cleared 5 varas since my last. I have received good accounts of the workings about the old shaft, which I hope to find correct.

CAPULA.—Capt. Bray, Jan. 24: The level of San Enrique east, on the main vein, has been driven 4·55 varas, by four men and two boys, at $20 and $16 per vara; there are again symptons of a change for the better, the end containing a branch of quartz, with indications of ore. The cross-cut south on this lode has been driven over 7 varas, and has cut several narrow branches, two or three of which carry small quantities of fair ore, but of no commercial value; this cross-cut is suspended, having to all appearance crossed the whole of the southern portion of the vein. The cross-cut north is in very hard ground, and little impression has been made in it; I have now put one of the best pares of men to drive it. There is a branch of poor ore in the bottom of the same nature as that in La Esperanza level, we are not yet through it, but so far it is about ¼ vara wide, and the quality may improve as we get further in. San Jose west was driven last by two Englishmen, two natives, and two boys; they drove only 0·23 varas last week, and have gone through several varas of good lode, which though narrow will pay for stoping, as it contains some very good ore. In the same level, east of the shaft, I have set a cross-cut north from the end we drove on Utro Amo lode, to cut the lode of San Jose; we ought to cut it in about 4 varas driving. This lode generally carries ore, but is subject to many and sudden changes. In the level above, on the same lode, the end west is set to drive at $20 per vara; there is a narrow branch of ordinary ore in the south part of the end, which I hope will improve as we advance westward, as we are getting over where we have the branch of good ore below. La Esperanza level west continues about the same as last reported, the lode consisting of quartz, both solid and friable, with spots of antimony, and at times indications of silver, sometimes accompanied by a very hard porphyritic rock. We have now driven nearly 30 varas in this level, the ventilation at times is still very bad, but is much better than it was before the shaft was opened to its full size in the adit level. In the Bomba shaft we met with large rocks, that had fallen and completely blocked it; these have been removed, and we are now engaged in securing what we have gone through, preparatory to dividing and laying the casing. The repairs of the road will be finished in a few days, when I shall be able to send on the lift of pumps for the shaft; although the pieces are small, and comparatively light, it will be a difficult and expensive operation to get them transported to Capula. For the horse-engine we have to make the pattern at the mine, and to this end we have to fit up a lathe, which is in hand; we have also to fit up a boring-machine, as we cannot get fitting work done at the foundry—this is also nearly completed, but these operations occupy so much time as sadly to interfere with our calculations. The bob-pit at the surface is sunk, and almost ready for the masons, the frame being nearly completed. In the hacienda we have about the same number of hands engaged in cutting ground for the water-way, and which serves also for filling in the ravine; this part of the cutting will not occupy us much longer, and as soon as it is finished the masons can be put to work to secure it before the rain comes on. I have remitted in all 62 cargas of best ore for reduction to the hacienda of San Pascual, leaving over 150 cargas at the mine of too poor a quality to remit.

CAPE COPPER.—Mr. Steele, Jan. 16: Nababeep: The trials at this place have been confined to two shafts, one of which is now down 50 ft., showing good ores, principally purple sulphurets, throughout. We shall shortly commence to take down the orey outcrop standing from 20 to 30 feet above the level at which the shaft has been commenced, and when that is done shall open out the ground through which the shaft has passed. The appearance of the place is, I think, very encouraging, and every prospect exists of a good mine being at work within a few months. There are other excellent indications in the immediate neighbourhood of these shafts that remain untried, but openings will be made upon them as soon as men can be got together and arrangements made for the work.—Spectakel: The falling off in the yield from this mine has been owing mainly, I think, to the way in which the work has been carried on. Arrangements have now been made, however, for working the lower ground, and cutting away present floor of deep cutting, which I have every confidence will effect the returns very favourably. The steam-crusher does its work admirably, and the engineer is well up to his work.—Ookiep: In regard to this mine, I can only say that up to the date of my leaving Namaqualand the prospects appeared remarkably good for a large yield during the present year. The cross-cuts driving east and west at a depth of 50 ft. below present bottom are the most important trials carrying on, and every foot driven in ore adds considerably to the value of the mine. Up to the 9th inst. one end had advanced 13 feet and the other 9 feet, and both continued in good ore. The bricks for the furnace having all arrived at Springbok, Mr. Davis was quite prepared to commence the work, and I trust as soon as the riding season commences, and we are able to get up a supply of coke, or (say) about the middle of the year, operations on the poor ores will be commenced. I beg now to advise, having just concluded arrangements with the agents of the *Hastings*, A 1, 425 tons, for the charter of that vessel. The quantity of ore on the beach on Dec. 31 was 1882 tons belonging to the company; and of Phillips, King, and Co's. ore, 450 tons. Of the company's ore the *May* would take probably 300 tons; the *Croydon* about 100; and the *Hastings*, say 550—leaving 900 tons to be shipped, and for 500 tons of which I have still to secure freight. Writing on Jan. 20, the manager adds:—"For the month of December Ookiep has returned 176 tons of ore, averaging 25 per cent., and Spectakel gives 75 tons of ore, averaging 30 per fm. I have agreed to charter a small vessel hourly expected here from Algoa Bay to take about 130 tons of ore. The quantity of ore for the first eight months has been estimated on so safe a principle that the actual figures will exceed the quantity already given."

WILDBERG.—Z. Walls, Feb. 26: We have weighed off to the buyers for last month 140 tons 7 cwts. 74 lbs. of silver-lead ore. For the present month I am glad to say our returns and profit will be greater. The work, both underground and at surface, is proceeding satisfactorily, and the pitches and bargains, as will be seen from the following report, are producing fair quantities of silver-lead ore. The three stopes at work at the Neuerdorn shaft are producing for each stope 20 cwts. of silver-lead ore per lachter. The four stopes in the back of the Mittel Strecke, Michael's Shaft, are producing for each stope 12 cwts. of silver-lead ore per lachter. The two stopes in the back of the deep adit, between Michael's and Carter's shafts, on the Dornergang lode, are producing for each stope 20 cwts. of silver-lead ore per lachter; and the two stopes in the back of the same level, on the Gottes Hülfe lode, are producing for each stope 30 cwts. of silver-lead ore per lachter. The 10 lachter level, driving west from Carter's shaft, on the Dornergang lode, is producing at present about 10 cwts. of silver-lead ore per lachter; and the five stopes at work in the back of this level are producing on an average for each stope about 30 cwts. of silver-lead ore per lachter. The 10, driving east from Carter's shaft, on the Erbteiftergang lode, is unproductive; but we have two stopes at work in the back of this level, producing for each stope 18 cwts. of silver-lead ore per lachter. The 20, driving west from Carter's shaft, on the Dornergang lode, is unproductive. The 20, driving east, on the Erbteiftergang lode, is producing 60 cwts. of silver-lead ore per lachter; and the two stopes in the back of the same are producing for each stope 50 cwts. of silver-lead ore per lachter. We had a hard floor of ground in Carter's shaft, which much impedes our speed in sinking.

THAMES TUNNEL COMPANY.—Receipts for the week ending February 27, 84*l.* 18*s.* 8*d.*; number of passengers, 20,384.

LONDON GENERAL OMNIBUS COMPANY.—The traffic receipts for the week ending February 28 was 9379*l.* 1*s.* 1*d.*

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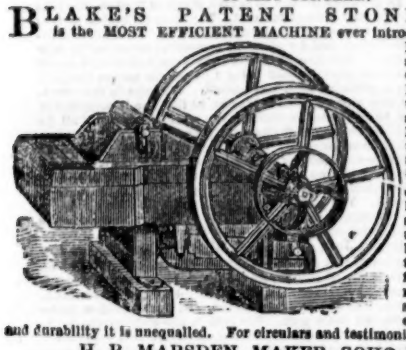

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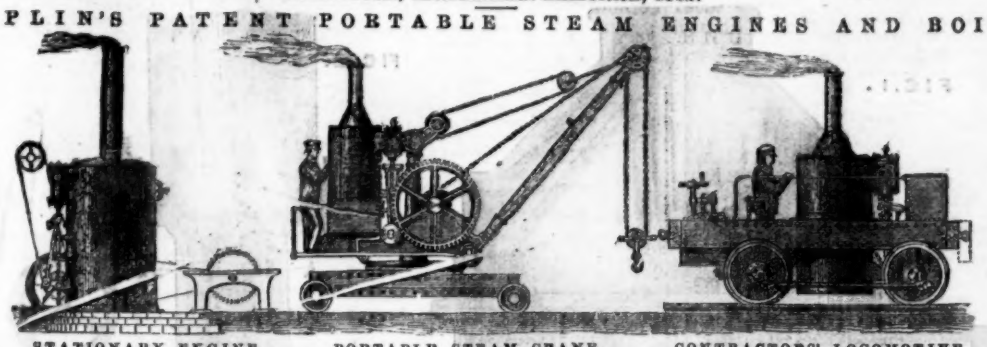

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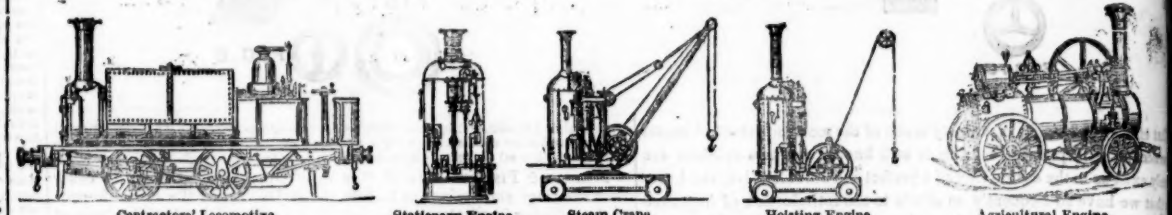

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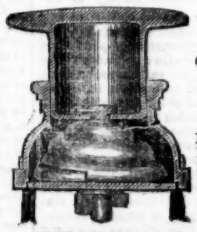

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Sizes.	Garnock, Bibby, and Co. Tons	c.	Corresponding sizes from other manufacturers. Tons	c.	Tons	c.
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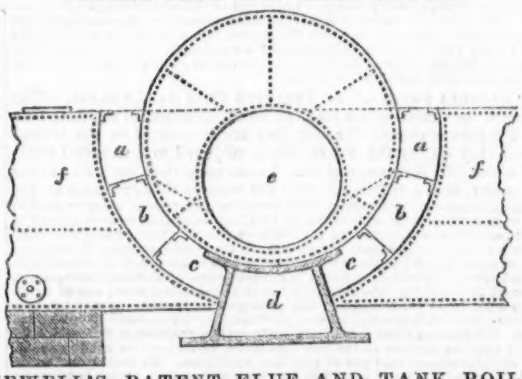
PATENT FLUE AND TANK BOILER.



JEWELL'S PATENT FLUE AND TANK BOILER
A PLAN FOR ECONOMISING THE CONSUMPION OF FUEL IN STEAM BOILERS.

The advantages of this boiler, an illustrated description of which was published in the MINING JOURNAL of October 3, are obvious.

It is provided with WROUGHT IRON FLUES, conveying the fire entirely over the surface of boiler below the water line, and wholly doing away with lime coming in contact with any part of the boiler, lime having been found to destroy the boiler plates before any other parts are the worse for wear. This boiler has four additional flues to the plan at present adopted, thus affording a FAR GREATER AMOUNT of HEATING SURFACE, and MORE EFFECTUALLY CONSUMING the GASES. Between the boilers a wrought-iron tank is fixed, extending the whole length of the boilers, for containing water for feed; this water will pass into the boiler at any temperature required. This boiler will not require anyone to enter the flues for cleansing, as the flues are provided with shifting stoppers at the ends, enabling a person to cleanse the flues even while the boiler is hot; this plan answers for any size or length boiler, and will do away with the cold water feed, which has been the cause of so many accidents. These flues are made of wrought or cast-iron. On the top of the tank a pipe will be placed, to take the waste steam that escapes and carry it to the cistern. The flues for a 6 ft. boiler will be 2 ft. long, and the usual width. It must be remembered that the tank once hot will remain a hot body, with the same amount of heat that passed off before in the brick flues. I would observe that there will be no more water taken from these tanks than will be required for the feed, consequently no more cold water will pass into these tanks than will be necessary for feeding. It is believed this plan will SAVE TEN FEET in the LENGTH of BOILER, and it has been proved to EFFECT a SAVING of rather MORE than ONE-THIRD in the CONSUMPTION of FUEL. These boilers, with flues and tanks, can be supplied on the most reasonable terms.

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